Identifying the Post COVID-19 Digital Divide in Chronic Pain Care

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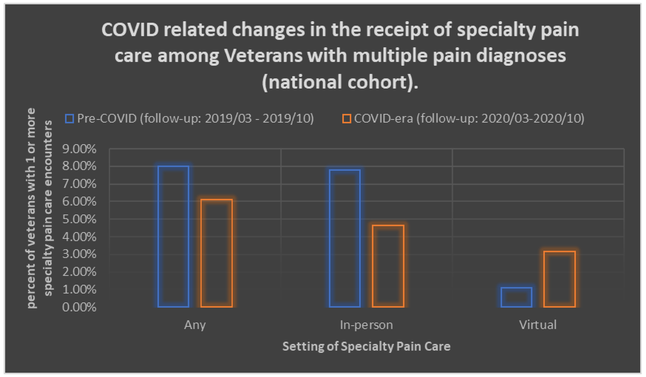
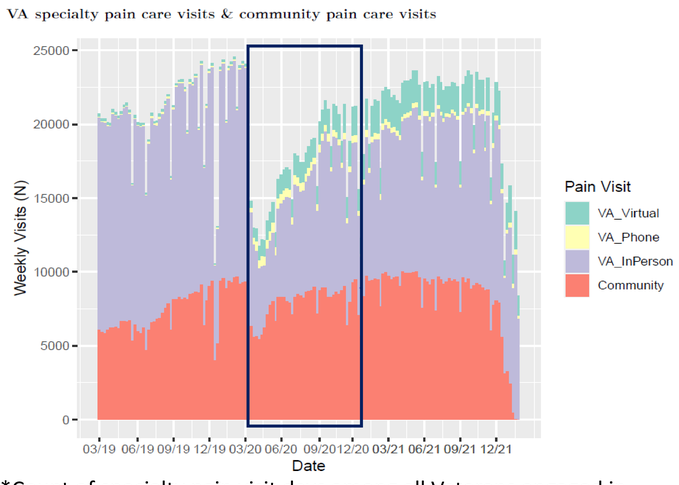
WHAT HAPPENED TO SPECIALTY PAIN CARE UTILIZATION IN THE VA POST COVID ONSET **ON AVERAGE**?



- Between the pre-COVID and the COVID-era, the number of Veterans receiving specialty pain care:
  - Increased by 188.9% for virtual care
  - Decreased by 40.7% for in-person care
- During the 8 months post COVID onset, **24.4% fewer Veterans** received chronic pain specialty care in either virtual or in-person care.

PAIN SPECIALTY CARE IN THE COMMUNITY RESUMED FASTER THAN VA SPECIALTY PAIN CARE.

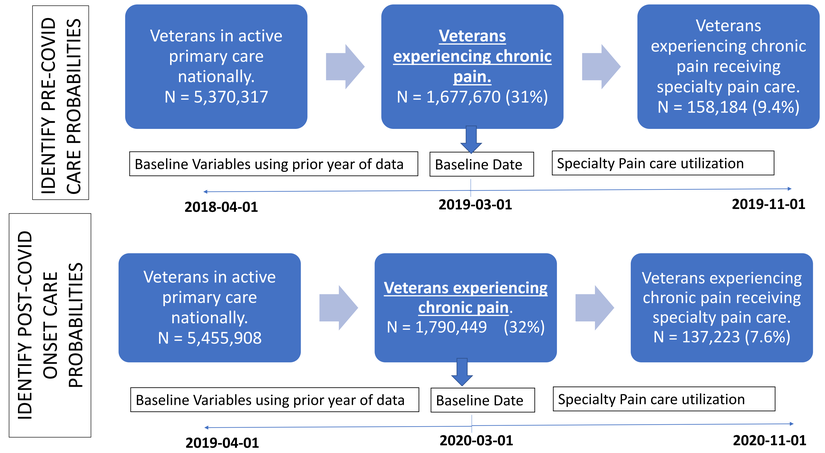


**Count of specialty pain visit days among all Veterans engaged in VA or VA paid community primary care.

OVERALL GOAL: BUILD AN ARTIFICIAL INTELLIGENCE (AI) SOLUTION TO IDENTIFY DEVELOPING CARE DISPARITIES.

- Identify Veterans at high risk of losing access to specialty pain care following the onset of COVID-19.
  - Construct national cohort of Veterans experiencing chronic pain.
  - Build relevant computational phenotypes.
  - Use machine learning approaches to identify expected probability of pain specialty care utilization using pre-COVID and post COVID onset cohorts.
  - Identify Veterans at highest risk of losing access to care.
  - Compare Denver, Seattle, and National results.

STUDY DESIGN



MACHINE LEARNING MODELING APPROACH[1]

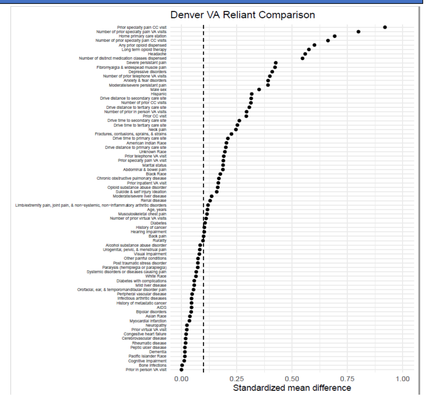
- Goal: Conditional on relevant baseline variables, estimate expected probability of care utilization if COVID had never occurred.
  - **ML Model 1**: Using the ***pre-COVID cohort*** to represent this counterfactual state, develop ML model estimating probability of care engagement.
  - After developing ML model 1, make predictions using the post COVID onset cohort.
- Goal: Conditional on relevant baseline variables, estimate expected probability of care utilization during COVID.
  - **ML Model 2:** Using the ***post-COVID onset cohort*** to represent this observed state, develop ML model estimating probability of care engagement post-COVID.
- The difference in predicted probability between ML Model 1 and ML Model 2 is the estimated change in access to care.

- **Models considered**: GBM, XGBoost, GLM, Deep Learning, DRF, stacked ensemble all models (42 total models tried representing different hyperparameter settings)
- **Model Validation**: 5-fold cross validation with external assignment into folds prior to model fitting.
- **F1 statistic** (harmonic average of Precision and Recall) chosen for model optimization/selection due to somewhat rare outcome (true negatives not of interest).
- **Multiple models fit**:
  - For each of (National), (Seattle), (Denver):
    - Pre-covid model using pre-covid cohort
    - Post-covid onset model using post covid onset cohort

Focus on Denver Area Veterans: VA Reliant group.

23,534 Denver Veterans experiencing chronic pain during COVID era. 1,132 had a predicted probability of pre-COVID VA pain care of at least 0.2.

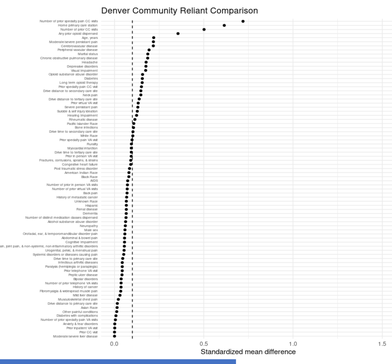
	Prob diff <=0	0< Prob diff <=0.25	Prob diff > 0.25
n	103	745	284



Focus on Denver Area Veterans: Community Reliant group.

23,534 Denver Veterans experiencing chronic pain during COVID era. 1,586 had a predicted probability of pre-COVID VA pain care of at least 0.2.

	Prob diff <=0	0< Prob diff <=0.25	Prob diff > 0.25
n	449	1,067	70



Results Summary

VA reliant:

- Less likely to lose access:
  - Veterans exposed to Opioids.
  - White or Female
  - Younger Veterans
  - Veterans with MH comorbidities
  - Veterans with Pain related diagnoses
  - Veterans with SUD
- More likely to lose access:
  - Black or Hispanic Veterans
  - Older Veterans
  - Urban Veterans

Community reliant:

- Gender/race not associated with access
- Less likely to lose access:
  - Veterans exposed to Opioids.
  - Veterans with MH comorbidities
  - Veterans with Pain related diagnoses
- More likely to lose access:
  - Veterans with MH comorbidities
  - Veterans with SUD

ACKNOWLEDGEMENTS

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